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Space Administration

John C. Stennis Space Center
Stennis Space Center, MS 39529-6000

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September 2016

John C. Stennis Space Center

Risk Management Procedural Requirements

Stennis Procedural Requirements	SPR 7120.1	C
	<i>Number</i>	<i>Rev.</i>
	Effective Date:	September 30, 2016
	Expiration Date:	September 30, 2021
Page 2 of 24		
Responsible Office: QA00/Safety and Mission Assurance Directorate		
SUBJECT: Risk Management Procedural Requirements		

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Revision A	12/15/08	Buddy Newbold x 8-3152	Complete revision to basic document to implement Integrated Risk Management and provide framework that integrates risk-informed decision making and risk-management process within the organizational structure of the Center.
Revision A-1	October 2010	Mike Rewis 8- 2663	Changed all references of acronym for the responsible Office from S&MA to SMA. Corrected typographical and grammatical errors throughout document. Updated Center Director signature block. Updated Appendix C. Removed Appendix E.
Revision B	May 2014	Kimberly R. Johnson 8-3297	Updated risk management procedure to include new methodology which ranks active risks to provide numerical fidelity and assist in the Executive decision-making process. Appendices have been updated to reflect correct use and document flow. Administrative corrections (MRW).
Revision C	June 2016	Kamili M.J. Shaw	Updated 1.5, Risk Reporting, to add detail to the heuristic analysis. Replaced IRMA with "central risk management database" throughout. Replaced center watch item or list with medium risks throughout. Deleted Appendix F, SSC RISK TRAINING.

Stennis Procedural Requirements	SPR 7120.1	C
	<i>Number</i>	<i>Rev.</i>
	Effective Date:	September 30, 2016
	Expiration Date:	September 30, 2021
Page 3 of 24		
Responsible Office: Safety and Mission Assurance Directorate		
SUBJECT: Risk Management Procedural Requirements		

Table of Contents

PREFACE	5
P.1 PURPOSE	5
P.2 APPLICABILITY	5
P.3 AUTHORITY	5
P.4 APPLICABLE DOCUMENTS	6
P.5 MEASUREMENT/VERIFICATION	6
P.6 CANCELLATION	6
CHAPTER 1. INTRODUCTION	7
1.1 Risk Management (RM) at SSC	7
1.2 SSC Integrated Risk Management Process.....	7
1.3 Risk Informed Decision Making (RIDM).....	7
1.4 Continuous Risk Management (CRM)	8
1.5 Risk Reporting	8
CHAPTER 2. RISK MANAGEMENT ROLES AND RESPONSIBILITIES	10
2.1 John C. Stennis Space Center	10
2.2 Center Director.....	10
2.3 Directors and Office Managers.....	10
2.4 SSC Safety and Mission Assurance Directorate (SMA).....	11
2.5 Center Integrated Risk Manager	12
2.6 Directorate/Office Organizational Risk Point-of-Contact (RPOC)	12
2.7 SSC Joint Management Council (JMC) and Center Review Boards.....	13
CHAPTER 3. RISK MANAGEMENT ACTIVITIES	14
3.1 Risk Assessments.....	14
3.2 Risk Tracking.....	14
3.3 Risk Mitigation Planning	14
APPENDIX A ACRONYMS	15
APPENDIX B DEFINITIONS	16
APPENDIX C SSC RISK MANAGEMENT PROCESS FLOW	19

Stennis Procedural Requirements	SPR 7120.1	C
	<i>Number</i>	<i>Rev.</i>
	Effective Date:	September 30, 2016
	Expiration Date:	September 30, 2021
Page 4 of 24		
Responsible Office: Safety and Mission Assurance Directorate		
SUBJECT: Risk Management Procedural Requirements		

APPENDIX D	SSC PROBABILITY IMPACT DIAGRAM	20
APPENDIX E	CONTINUOUS RISK MANAGEMENT	21
APPENDIX F	SSC ORGANIZATIONAL RISK MANAGEMENT PLAN OUTLINE	23
APPENDIX G	JMC RISK VETTING PROCESS FLOW	24

Stennis Procedural Requirements	SPR 7120.1	C
	<i>Number</i>	<i>Rev.</i>
	Effective Date:	September 30, 2016
	Expiration Date:	September 30, 2021
Page 5 of 24		
Responsible Office: Safety and Mission Assurance Directorate		
SUBJECT: Risk Management Procedural Requirements		

PREFACE

P.1 PURPOSE

- a. This Stennis Procedural Requirement (SPR) implements the requirements for Integrated Risk Management (RM) for John C. Stennis Space Center (SSC), its Directorates/Offices, and its programs and projects. Defining a tailored RM process that integrates Risk-Informed Decision Making (RIDM) and Continuous Risk Management (CRM) for SSC is the principle purpose of this document.
- b. The purpose of addressing RM at the Center-level is to ensure all risks are identified, captured, and communicated in a common way across the Center. The Integrated RM process set forth in this document provides bottom-up, detailed, continuous assessment of risk; provides support for the identification and mitigation of institutional risks; and integrates RM activities within the SSC organizational structure across the Center and supports RIDM capabilities Center-wide.

P.2 APPLICABILITY

- a. This SPR applies to all SSC Directorates and Mission Support Offices.
- b. This SPR applies to NASA SSC contractors to the extent specified by their respective contracts.
- c. For NASA programs/projects/tasks residing at SSC, the requirements in this SPR should be treated as additional requirements to risk identification and managing responsibilities related to specific NASA program and project goals and objectives. In particular, this document shall be the primary guidance when there is risk concerning Center infrastructure.
- d. This SPR defines the methods and the tools used in the CRM process and the practices to be used within SSC.
- e. In this SPR, a requirement is identified by “shall”; a good practice by “should”; permission by “may” or “can”; and descriptive material by “is” or “are” (or another form of the verb “to be”).

P.3 AUTHORITY

- a. NPD 1000.0, *NASA Governance and Strategic Management Handbook*
- b. NPD 1001.0, *2014 NASA Strategic Plan*

Stennis Procedural Requirements	SPR 7120.1	C
	<i>Number</i>	<i>Rev.</i>
	Effective Date:	September 30, 2016
	Expiration Date:	September 30, 2021
Page 6 of 24		
Responsible Office: Safety and Mission Assurance Directorate		
SUBJECT: Risk Management Procedural Requirements		

- c. NPD 8700.1, *NASA Policy for Safety and Mission Success*
- d. NPR 8000.4, *Agency Risk Management Procedural Requirements*
- e. NPR 8820.2, *Facility Project Requirements*
- f. SPD 7120.1, *SSC Institutional Risk Management*

P.4 APPLICABLE DOCUMENTS

- a. SBCC-1150-0013, *Risk Review Panel (RRP) Charter*
- b. SCWI-8080-0001, *Propulsion Test Project Management*

P.5 MEASUREMENT/VERIFICATION

Compliance with requirements cited in this SPR will be monitored through the SSC Safety and Mission Assurance Directorate (SMA) by objective evidence tracked through:

- a. Periodic review of directorate/office level Top Risk Reports.
- b. Periodic review of directorate/office level RM and RIDM processes.

P.6 CANCELLATION

SPR 7120.1, Rev B dated May 2014.

Signature on File

Richard J. Gilbrech, Ph.D.
Director

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Stennis Procedural Requirements	SPR 7120.1	C
	<i>Number</i>	<i>Rev.</i>
	Effective Date:	September 30, 2016
	Expiration Date:	September 30, 2021
Page 7 of 24		
Responsible Office: Safety and Mission Assurance Directorate		
SUBJECT: Risk Management Procedural Requirements		

CHAPTER 1. INTRODUCTION

1.1 Risk Management (RM) at SSC

a. RM is a method of managing that concentrates on the identification and control of events that have a potential to cause an undesired impact. It is a proactive, risk-informed approach to enable and enhance the decision makers' effective selection of key decision alternatives with implementation and follow-through. In this document, RM is defined in terms of RIDM and CRM. The purpose of integrating RIDM and CRM into a coherent framework at the Center is to foster proactive RM across the Center to better inform decision making through better use of risk information.

b. This SPR implements RM using existing organizational structure and reporting. This approach leverages the NASA Strategic Management Process and assures communication across the entire Center utilizing management councils, directorate/office reviews, and an electronic risk information application database to support RIDM. As a result, the RM process and organization directly correlate with the established organizational structure and provide a simple to use, scalable, and documented process. Utilizing a central risk management database to document and update risks allows the director/manager to create and maintain an information environment where risk information is collected in a coherent manner across the Center and can proceed up from the sub-directorate level through the directorates/offices to the Center-level.

1.2 SSC Integrated Risk Management Process

a. The directorate/office shall provide RM organizational integration and communication.

b. Sub-directorate organizations shall be responsible for carrying out a sustained effort to implement RM and RIDM by adopting best practices within their organization to support directorate/office implementation of the requirements set forth in this document. This includes implementation of these processes for divisions within the directorate/office as well as within the established contractor reporting mechanisms for contractors supporting the mission of the directorate/office. The process is depicted in greater detail in Appendix C of this document.

1.3 Risk Informed Decision Making (RIDM)

a. RIDM is a deliberative process to provide risk information as an element in decision making and takes place at many different venues and many different organizational levels across the Center, including boards and panels and management reviews. RIDM provides the decision maker with an assessment of related risk to support management decisions. The ultimate decision is *informed* and not solely based upon the risk assessment information provided by the RIDM process. RIDM shall be embedded as a routine portion of management reviews and implemented by directorates/offices in order to support decision making at that level.

Stennis Procedural Requirements	SPR 7120.1	C
	<i>Number</i>	<i>Rev.</i>
	Effective Date:	September 30, 2016
	Expiration Date:	September 30, 2021
Page 8 of 24		
Responsible Office: Safety and Mission Assurance Directorate		
SUBJECT: Risk Management Procedural Requirements		

- b. All SSC Center-level risks shall be identified and entered into the central risk management database and assessed based upon likelihood and consequence utilizing the standardized SSC Probability Impact Diagram (PID) in Appendix D.
- c. Independent risk assessments may be conducted as a part of an organization's risk-informed process utilizing analysis techniques (e.g., Monte Carlo analysis, Fault-Tree analysis, or network analysis).
- d. The results of analyses shall be documented in the central risk management database or the minutes of the Risk Review Panel meetings. The analyses shall support the SSC RIDM process and shall use the standard SSC PID.

1.4 Continuous Risk Management (CRM)

NASA uses a specific process for the management of risks. This process is referred to as CRM. All directorates/offices shall implement a CRM process aimed at identifying, analyzing, planning, tracking, controlling, communicating, and documenting risks. This process supports integration of organizational performance measures within a comprehensive decision-making framework and is complementary to those activities mentioned above. It aligns with SSC's established reporting requirements. Coupling the CRM to the decision-making processes provides the focus and accountability of RIDM. The collective benefit is a RM process that supports better decisions across the Center. A brief summary of the CRM paradigm is provided in Appendix E.

1.5 Risk Reporting

- a. All active directorate/office risks within the central risk management database will be rated using six (6) criteria: cost, schedule, performance, safety, duration, and SSC profile. Each criterion is rated from one (1) to five (5) based on the SSC PID in Appendix D.

A threshold is established based on considering all six (6) consequence criteria from each risk and ranking the entire risk list. All of the active risks are then plotted in descending order. After ranking the risks, inflection points are determined using histogram analysis. While the first two (2) inflection points are the most important in the risk management process, more than two (2) inflection points may be used during the analysis. The first two (2) inflection points on the generated curve bound the potential Top and Medium Risks. Specifically, the risks above the highest threshold are considered most significant and noted as potential Top Risks. The risks just beneath the highest threshold and above the second inflection point should also have increased visibility and are noted as Medium Risks.

- b. Each directorate/office may establish and maintain an internal top risk report and watch list. The watch list generally represents risks that are rated as having very low impact and

Stennis Procedural Requirements	SPR 7120.1	C
	<i>Number</i>	<i>Rev.</i>
	Effective Date:	September 30, 2016
	Expiration Date:	September 30, 2021
Page 9 of 24		
Responsible Office: Safety and Mission Assurance Directorate		
SUBJECT: Risk Management Procedural Requirements		

consequence. These risks are routinely monitored or “watched” for a defined trigger that spurs additional action.

c. Each directorate/office shall enter risks in the central risk management database for decisions within the organizational unit and report the status on its risks that are included on the Center Top and Medium Risk list to the Risk Review Panel (RRP) monthly. The risks identified as potential Center Top and Medium Risks will be evaluated by the RRP. Each directorate/office’s potential Top and Medium Risks generated from the percent threshold methodology will be discussed and voted upon by the RRP. The accepted Center Top and Medium Risks will be submitted to the Center Director for concurrence. This process provides support for risk analysis of decision alternatives at the Center-level.

Stennis Procedural Requirements	SPR 7120.1	C
	<i>Number</i>	<i>Rev.</i>
	Effective Date:	September 30, 2016
	Expiration Date:	September 30, 2021
Page 10 of 24		
Responsible Office: Safety and Mission Assurance Directorate		
SUBJECT: Risk Management Procedural Requirements		

CHAPTER 2. RISK MANAGEMENT ROLES AND RESPONSIBILITIES

2.1 John C. Stennis Space Center

SSC consists of directorates and mission support offices that support management of critical Center functions. Each directorate/office shall identify their organizational risks based upon performance measures and mission support requirements. Each directorate/office shall establish and implement RM and RIDM consistent with requirements set forth in this document.

2.2 Center Director

A key role of the Center Director is to support the directorate/office needs in order to fulfill the Center's role in meeting the Agency's strategic goals. Directorates/Offices shall support these practices by exercising their organizational mission and responsibilities as defined by mission statements and organizational structure. The Center Director shall be responsible for management of risks at the Center. These responsibilities include:

- a. Providing appropriate levels of authority, resources and funding necessary for implementation of the SSC risk management program.
- b. Serving as the ultimate risk acceptance/disposition official for SSC organizations.
- c. Incorporating reviews of Center Top and Medium risks into recurring SSC JMC and Center-level Review Boards to support risk analysis of decision alternatives and assessment of organizational performance requirement baselines.

2.3 Directors and Office Managers

Each director/manager shall be responsible for implementing, managing, and reporting risks within their organization using the process identified in this SPR. These responsibilities include:

- a. Designating an organizational Risk Point-of-Contact (RPOC) to facilitate the process and ensure compliance with SSC's Integrated RM requirements.
- b. Providing the RPOC with sufficient authority and support to represent the organization.
- c. Ensuring that risks are identified and analyzed, and that key decisions of the organization are risk informed.
- d. Managing organizational institutional risk that solely affects their sub-organizational elements.

Stennis Procedural Requirements	SPR 7120.1	C
	<i>Number</i>	<i>Rev.</i>
	Effective Date:	September 30, 2016
	Expiration Date:	September 30, 2021
Page 11 of 24		
Responsible Office: Safety and Mission Assurance Directorate		
SUBJECT: Risk Management Procedural Requirements		

- e. Ensuring that sub-organizational risks are identified and that interdependencies are either managed at the current level or elevated.
- f. Assisting in the development and management of risks through participation in appropriate Councils and Review Boards.
- g. Reporting risks to the Center Director, SSC JMC, RRP, and other Review Boards as required.
- h. Providing appropriate levels of authority, resources and funding necessary for implementation within their respective directorates/offices.
- i. Providing support to the RRP.
- j. Ensuring risk owners and other personnel obtain RM training, as appropriate.
- k. Ensuring the development and coordination of an internal directorate/office RM plan utilizing the template provided in Appendix G. The Director/Manager or designated representative's signature is required to reflect approval. Other signatures may be added if applicable. The concurrence of the SMA Director or designee is required on all directorate/office-level plans.
- l. Ensuring risks are reviewed monthly with the aim of identifying, analyzing, tracking, controlling and documenting risks within their organization.

2.4 SSC Safety and Mission Assurance Directorate (SMA)

SMA shall be responsible for implementing a Center-level Integrated RM program and establishing RM guidelines, processes, and common standards throughout SSC. SMA shall serve as the process owner for Integrated RM at SSC. SMA's specific responsibilities include:

- a. Providing appropriate Center-level RM and RIDM policy, guidance and expertise.
- b. Appointing a Center-level Integrated Risk Manager.
- c. Ensuring that appropriate training is available as needed on applicable RM policies, tools, and processes.
- d. Performing independent internal assessments and verification of SSC organizational elements' RM and RIDM processes as directed by the Center Director and/or the SSC JMC.

Stennis Procedural Requirements	SPR 7120.1	C
	<i>Number</i>	<i>Rev.</i>
	Effective Date:	September 30, 2016
	Expiration Date:	September 30, 2021
Page 12 of 24		
Responsible Office: Safety and Mission Assurance Directorate		
SUBJECT: Risk Management Procedural Requirements		

- e. Providing RM support as necessary for communicating RM issues to organizations outside of NASA.
- f. Acting as the central risk management database configuration manager and administrator for SSC.
- g. Providing technical RM support to SSC management councils and review boards through participation in deliberations regarding RM as required and providing periodic reports on the status and results of its ongoing RM Program assessments.
- h. Providing technical RM expertise to the directorate/office's RPOC.
- i. Establishing and conducting an ongoing assessment and verification process for the SSC Integrated RM Program to monitor the wellness of the overall program.

2.5 Center Integrated Risk Manager

The Center Integrated Risk Manager shall be responsible for providing directorate/office-level RM support to planning, risk identification, risk analysis, risk tracking, risk mitigation, and reporting. Responsibilities include:

- a. Serving as the chair of the Risk Review Panel.
- b. Providing RM expertise in support of RIDM and CRM process implementation and integration activities across the Center.
- c. Providing specific training on the central risk management database, SSC Integrated RM and CRM.
- d. Providing and maintaining a risk database to identify, track, analyze, mitigate, and report risks.
- e. Providing technical RM support to SSC JMC and Review Boards as required.
- f. Supporting the development and maintenance of the Center Top and Medium Risk Report.
- g. Providing RM expertise to directorate/office RPOC in support of organizational implementation of RM and RIDM.
- h. Ensuring RM audits of directorates/offices' RM practices and procedures are conducted for best practices and integration opportunities, and to make the results of these audits available to Center Senior Management.

Stennis Procedural Requirements	SPR 7120.1	C
	<i>Number</i>	<i>Rev.</i>
	Effective Date:	September 30, 2016
	Expiration Date:	September 30, 2021
Page 13 of 24		
Responsible Office: Safety and Mission Assurance Directorate		
SUBJECT: Risk Management Procedural Requirements		

2.6 Directorate/Office Organizational Risk Point-of-Contact (RPOC)

Each directorate/office shall assign at least one individual to serve as its RPOC with the following responsibilities:

- a. Ensuring the development, implementation, and maintenance of the organizational element's RM plan, central risk management database, RIDM and CRM processes.
- b. Maintaining cognizance of all RM issues for subordinate organizational levels and serving as the point of contact for risk issues elevated from subordinate organizational elements.
- c. Representing the organization as a member of the RRP and coordinating RM activities with SMA, SSC management councils, and review boards.
- d. Ensuring all risk-owners and other individuals who require an account in the central risk management database receive training as needed.

2.7 SSC Joint Management Council (JMC) and Center Review Boards

- a. The deliberative process that takes place within these forums is the central element of RIDM at the Center. The responsible official (e.g., Chair, Executive Secretary) for the SSC JMC, the RRP, and other Center Review Boards shall establish risk communication protocols (including the frequency and content of reporting) that satisfy the needs and requirements of this document.
- b. This communication may be accomplished using the standard risk reports or other risk-informed communication inputs to support decision making within the specific council or review board. These processes shall be coordinated with the SSC SMA. See Appendix H for the JMC Vetting Process.

Stennis Procedural Requirements	SPR 7120.1	C
	<i>Number</i>	<i>Rev.</i>
	Effective Date:	September 30, 2016
	Expiration Date:	September 30, 2021
Page 14 of 24		
Responsible Office: QA00/Safety and Mission Assurance Directorate		
SUBJECT: Risk Management Procedural Requirements		

CHAPTER 3. RISK MANAGEMENT ACTIVITIES

3.1 Risk Assessments

All SSC organizational elements shall use the SSC assessment criteria embedded in the central risk management database to support their risk assessment process and the 5x5 PID depicted in Appendix D. This scorecard provides a common reference framework across the Center and enables a coherent risk data comparison.

3.2 Risk Tracking

Each directorate/office shall track their risks in the central risk management database. The intent of risk tracking is to ensure that all risks are identified, captured, and communicated within the appropriate hierarchical units at the Center. This assures that appropriate risk information is available for decision makers at all levels to support successful risk mitigation.

3.3 Risk Mitigation Planning

- a. Risk mitigation plans shall be developed within the central risk management database and include the specifics of what should be done, when it should be accomplished, and who is responsible.
- b. All risks rated as red or yellow shall have a mitigation plan developed and documented in central risk management database. Each plan may have several mitigation tasks (as required to adequately address the identified risk) that need to be performed by different owners.
- c. Organizational units should reevaluate known risks on a periodic basis. Specifically, at the successful completion of a mitigation step, the likelihood and consequence of the risk shall be adjusted accordingly.

Stennis Procedural Requirements	SPR 7120.1	C
	<i>Number</i>	<i>Rev.</i>
	Effective Date:	September 30, 2016
	Expiration Date:	September 30, 2021
Page 15 of 24		
Responsible Office: QA00/Safety and Mission Assurance Directorate		
SUBJECT: Risk Management Procedural Requirements		

APPENDIX A ACRONYMS

CRM	Continuous Risk Management
JMC	Joint Management Council
NPD	NASA Policy Directive
NPR	NASA Procedural Requirements
PID	Probability Impact Diagram
RIDM	Risk Informed Decision Making
RM	Risk Management
RMP	Risk Management Plan
RPOC	Risk Point-of-Contact
RRP	Risk Review Panel
SBCC	Stennis Boards, Councils and Committees
SCWI	Stennis Common Work Instruction
SMA	Safety and Mission Assurance Directorate
SSC	John C. Stennis Space Center
SPD	Stennis Policy Directive
SPR	Stennis Procedural Requirements

Stennis Procedural Requirements	SPR 7120.1	C
	<i>Number</i>	<i>Rev.</i>
	Effective Date:	September 30, 2016
	Expiration Date:	September 30, 2021
Page 16 of 24		
Responsible Office: QA00/Safety and Mission Assurance Directorate		
SUBJECT: Risk Management Procedural Requirements		

APPENDIX B DEFINITIONS

Word	Definition
Acceptable Risk	The risk that is understood and agreed to by the Directorate/Office Risk Point of Contact to be a risk.
Candidate Risk	A potential risk that has been identified and is pending approval by the Risk Point of Contact.
Closed Risk	A risk that is no longer a risk to the organizational unit. For example, a risk related to a given procurement may be closed after the procurement is complete.
Consequence	An assessment of the credible, potential impact / result(s) of a risk. It is the part of the risk statement that focuses on the intermediate and long-term impact of a risk and describes the key, negative outcome(s) of the current conditions.
Continuous Risk Management (CRM)	The process that identifies risks; analyzes their impact and prioritizes them; develops and carries out plans for risk mitigation or acceptance; tracks risk and the implementation of plans; supports informed, timely, and effective decisions to control risks and mitigation plans; and assures that risk information is communicated and documented.
Impact	The effect that a risk has on an activity, and a given risk may have multiple impacts. For example, the risk title might be "Failure of subcontractor." This might have multiple impacts on different activities, each with a different cost and time impact and probability.
Issue	An undesirable event that has occurred or will occur and its occurrence cannot be stopped / directly controlled.
Joint Management Council (JMC)	Center-level risk decision making authority. Among other duties, the JMC serves as the central element for risk informed decision making at the Center-level.
Likelihood	The probability that a risk will occur.
Medium Risk Report	Risks that are deemed less significant than a top risk but are not tolerable and are being mitigated. These are generally rated as yellow but sometimes red using the SSC Probability Impact Diagram.
Mitigation	Taking action to reduce the severity of a risk, either by reducing the probability of it occurring, or by reducing the level of impact if it does occur, or both.

Stennis Procedural Requirements	SPR 7120.1	C
	<i>Number</i>	<i>Rev.</i>
	Effective Date:	September 30, 2016
	Expiration Date:	September 30, 2021
Page 17 of 24		
Responsible Office: QA00/Safety and Mission Assurance Directorate		
SUBJECT: Risk Management Procedural Requirements		

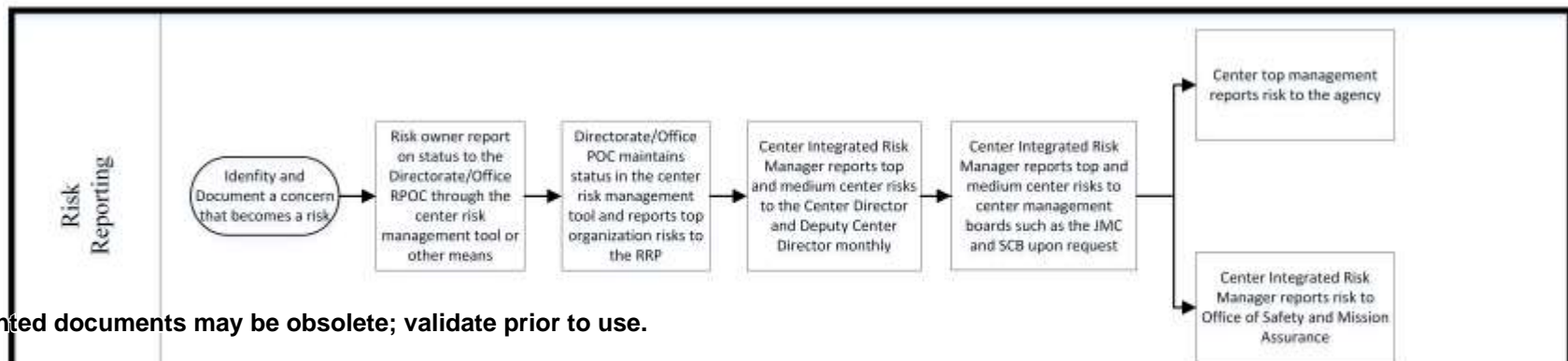
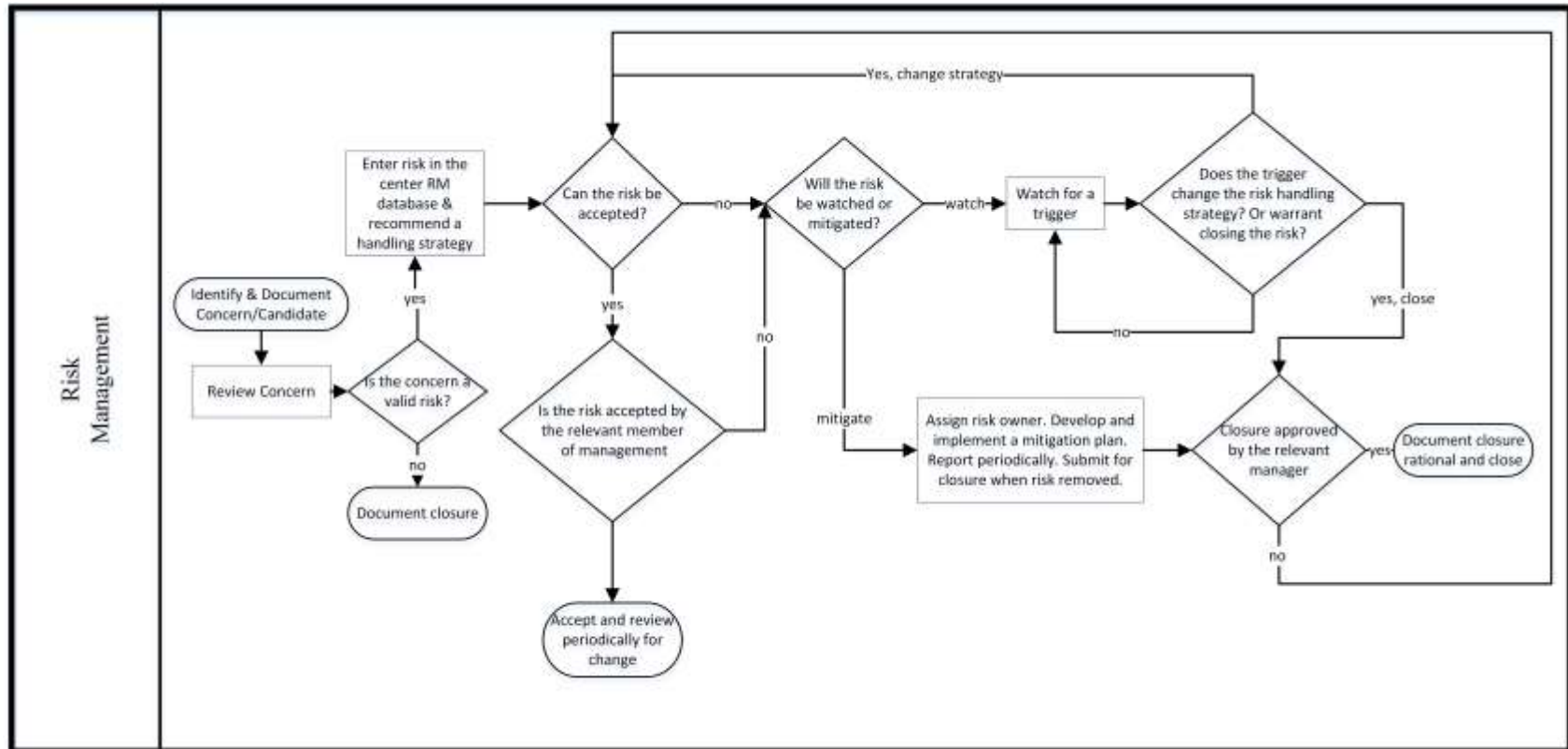
Word	Definition
Mitigation Plan	A plan put in place to mitigate a risk impact. The plan consists of a number of responses, and can act to mitigate more than one risk impact. For example, a mitigating plan which involves staff training or safety initiatives could act to mitigate a number of risks within your organization.
Open Risk	A risk that has not been closed or accepted.
Probability	The likelihood of a risk impact occurring.
Problem	A risk that has already occurred.
Risk	The combination of the probability (qualitative or quantitative) of an undesired event such as cost overrun, schedule slippage, safety mishap, or failure to achieve a needed technological breakthrough; and the consequences, impact, or severity of the undesired event were it to occur.
Risk Acceptance	The determination and acceptance by the appropriate official that the consequences of an identified risk, should they occur, are acceptable without further mitigation.
Risk Informed Decision Making (RIDM)	A deliberative process in consultation with the organizational unit at the next lower level to inform management decision-making. RIDM requires the risk analysis of alternatives and the selection of a decision alternative that is informed by these results.
Risk Management (RM)	An organized, systematic decision-making process that efficiently identifies, analyzes, plans, tracks, controls, communicates, and documents risks.
Risk Point of Contact (RPOC)	Individual(s) responsible for providing Risk Management support to the Directorate/Office.
Risk Management Plan (RMP)	Document that formally defines and establishes an organization's approach to conducting RM including the organization's Risk Management strategy; organizational structure, relationships, and responsibilities for managing risk; guidelines and policies regarding processes, metrics and tools for executing and communicating an Integrated Risk Management methodology; and the Risk Management resource investments required.
Risk Owner	The individual to whom the risk is assigned for purposes of responsibility and accountability.
Risk Review Panel (RRP)	The risk vetting agency of the Center responsible for reviewing all risks submitted to senior management and developing a proposed Center-level Top and Medium risk report for submission to senior management.

Stennis Procedural Requirements	SPR 7120.1	C
	<i>Number</i>	<i>Rev.</i>
	Effective Date:	September 30, 2016
	Expiration Date:	September 30, 2021
Page 18 of 24		
Responsible Office: QA00/Safety and Mission Assurance Directorate		
SUBJECT: Risk Management Procedural Requirements		

Word	Definition
Risk Score	A numeric representation of the overall risk severity, taking into account both the risk impact and the probability of that impact occurring.
Risk Statement	A descriptive statement that defines the condition of the risk and its consequence.
Top Risk	Those undesirable events having both high probability and high impact/severity.
Top Risk Report	Risks that are deemed to have the greatest significance/impact. These are generally rated as Red but sometimes Yellow using the SSC Probability Impact Diagram.
Watch List	Risks in which the impacts (consequences) are tolerable given the current environment / circumstances. The impacts may be intolerable if the current environment / circumstances change, so these risks are monitored for a trigger that might warrant additional action. These risks are generally rated as Green using the SSC Probability Impact Diagram.

Stennis Procedural Requirements	SPR 7120.1	C
	<i>Number</i>	<i>Rev.</i>
	Effective Date:	September 30, 2016
	Expiration Date:	September 30, 2021
Page 19 of 24		
Responsible Office: QA00/Safety and Mission Assurance Directorate		
SUBJECT: Risk Management Procedural Requirements		

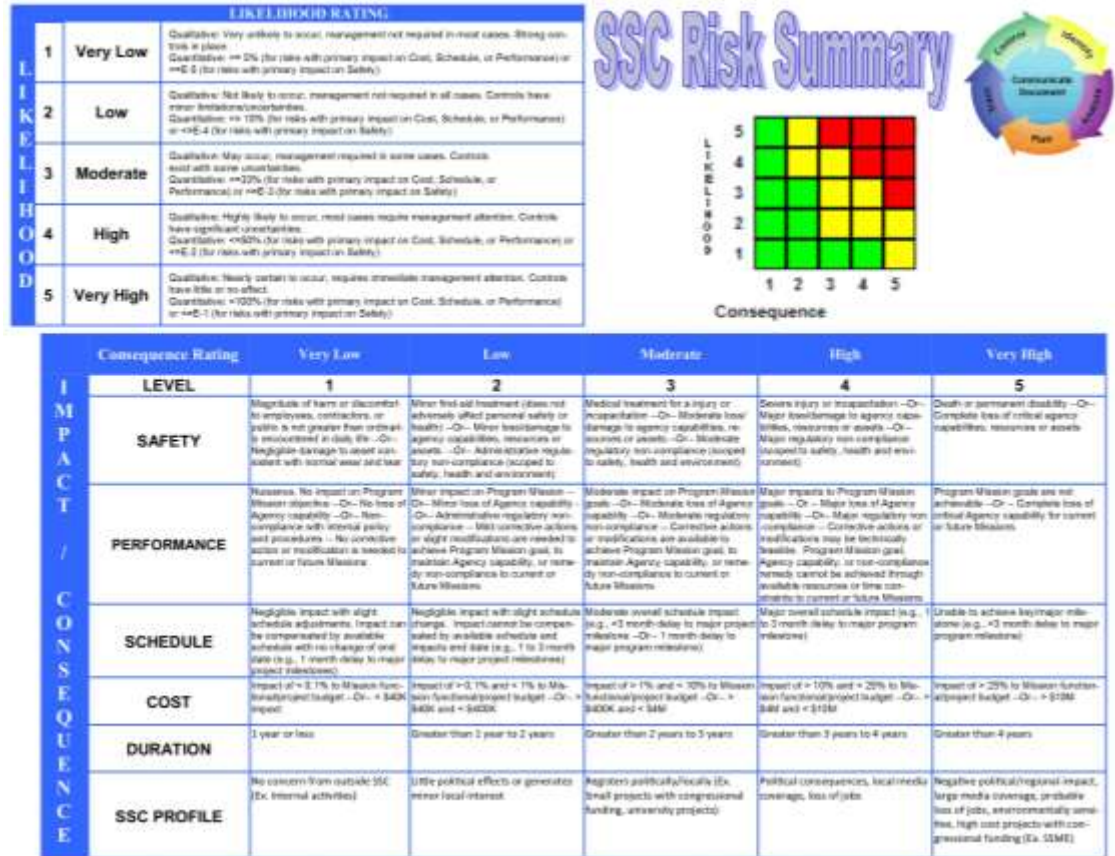
APPENDIX C SSC RISK MANAGEMENT PROCESS FLOW



Stennis Procedural Requirements	SPR 7120.1	C
	<i>Number</i>	<i>Rev.</i>
	Effective Date:	September 30, 2016
	Expiration Date:	September 30, 2021
Responsible Office: QA00/Safety and Mission Assurance Directorate		
SUBJECT: Risk Management Procedural Requirements		

APPENDIX D SSC PROBABILITY IMPACT DIAGRAM

Likelihood/ Consequence Risk Assessment



Stennis Procedural Requirements	SPR 7120.1	C
	<i>Number</i>	<i>Rev.</i>
	Effective Date:	September 30, 2016
	Expiration Date:	September 30, 2021
Page 21 of 24		
Responsible Office: QA00/Safety and Mission Assurance Directorate		
SUBJECT: Risk Management Procedural Requirements		

APPENDIX E CONTINUOUS RISK MANAGEMENT

The CRM paradigm depicts the different activities composing Risk Management. CRM provides ongoing assurance of progress towards the achievement of performance requirements. The model is represented as a circle to emphasize that Risk Management is a continuous process while the arrows show the logical and temporal flow of information between the activities in Risk Management. Communication is placed in the center because it is both the conduit through which all information flows and often the major obstacle to Risk Management. In essence, the paradigm is a framework for Risk Management. A brief summary of the Continuous Risk Management activities follows.



- a. **Identify**. Before risks can be managed, they must be identified. Identification surfaces risks before they become problems and adversely affect a project. An effective approach for surfacing risks is by the application of a disciplined and systematic process that encourages personnel to raise concerns and issues for subsequent analysis.
- b. **Analyze**. Analysis is the conversion of risk data into risk decision-making information. Analysis provides the basis for the project manager to work on the “right” risks.
- c. **Plan**. Planning turns risk information into decisions and actions (both present and future). Planning involves developing actions to address individual risks, prioritizing risk actions and creating a risk mitigation plan.
- d. **Track**. Tracking consists of monitoring the status of risks and actions taken to ameliorate risks. Appropriate risk metrics are identified and monitored to enable the evaluation of the status of risks themselves and of risk mitigation plans.
- e. **Control**. Risk control corrects for deviations from planned risk actions. Once risk metrics and triggering events (“Triggering Events” are warning or control limits) have been chosen, there is nothing unique about risk control. Rather, risk control melds into project management and

Stennis Procedural Requirements	SPR 7120.1	C
	<i>Number</i>	<i>Rev.</i>
	Effective Date:	September 30, 2016
	Expiration Date:	September 30, 2021
Page 22 of 24		
Responsible Office: QA00/Safety and Mission Assurance Directorate		
SUBJECT: Risk Management Procedural Requirements		

relies on project management processes to control risk action plans, correct for variations from plans, respond to triggering events, and improve Risk Management processes.

f. **Communicate/Document**. Risk communication and documentation lies at the center of the model to emphasize both their pervasiveness and criticality. Without an effective documentation system and successful communication, no RM approach can be viable. While communication facilitates interaction among the elements of the model, there are higher level communications to consider as well. To be analyzed and managed correctly, risks must be communicated to and between the Directorates/Offices. This is accomplished via the SSC JMC and supported by the RRP process.

Stennis Procedural Requirements	SPR 7120.1	C
	<i>Number</i>	<i>Rev.</i>
	Effective Date:	September 30, 2016
	Expiration Date:	September 30, 2021
Page 23 of 24		
Responsible Office: QA00/Safety and Mission Assurance Directorate		
SUBJECT: Risk Management Procedural Requirements		

APPENDIX F SSC ORGANIZATIONAL RISK MANAGEMENT PLAN OUTLINE

TABLE OF CONTENTS

- 1.0 INTRODUCTION
 - 1.1 Purpose and Objectives

- 2.0 ORGANIZATIONAL SUMMARY
 - 2.1 Description
 - 2.3 Responsibilities
 - 2.4 Performance Measures

- 3.0 RISK MANAGEMENT STRUCTURE
 - 3.1 Risk Structure Overview
 - 3.2 Stakeholders and Review Activities

- 4.0 RISK MANAGEMENT APPROACH AND INTEGRATION
 - 4.1 Risk Management Approach, Process, Methods, and Tools
 - 4.2 Risk Communication and Coordination Protocols
 - 4.3 RIDM Protocols
 - 4.4 Risk Management Resources and Schedule of Activities

Stennis Procedural Requirements	SPR 7120.1	C
	<i>Number</i>	<i>Rev.</i>
	Effective Date:	September 30, 2016
	Expiration Date:	September 30, 2021
Page 24 of 24		
Responsible Office: QA00/Safety and Mission Assurance Directorate		
SUBJECT: Risk Management Procedural Requirements		

APPENDIX G JMC RISK VETTING PROCESS FLOW

